



U.S. Department of
Transportation



Intelligent Transportation Systems Standards Fact Sheet

NTCIP 2101

National Transportation Communications for ITS Protocol (NTCIP) – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile

April 2002

Overview

The National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) is a family of standards that provides both the rules for communicating (called protocols) and the vocabulary (called objects) necessary to allow electronic traffic control equipment from different manufacturers to operate with each other as a system. The NTCIP is the first set of standards for the transportation industry that allows traffic control systems to be built using a “mix and match” approach with equipment from different manufacturers. Therefore, NTCIP standards reduce the need for reliance on specific equipment vendors and customized one-of-a-kind software. To assure both manufacturer and user community support, NTCIP is a joint product of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE).

Prior to the establishment of the NTCIP, traffic management centers used a number of proprietary protocols to exchange information with field devices such as traffic signal controllers and dynamic message signs. The goal of all NTCIP standards is to identify a common set of non-proprietary communications protocols that address requirements for center-to-center and center-to-field communications and promote interoperability.

What is this standard for?

This standard, **NTCIP 2101 – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile**, specifies a set of requirements for implementation of a communications network typically found in traffic signal controller systems. It permits other devices, such as dynamic message signs and ramp meter, to be integrated with controllers and to share a common communications media. It also defines a subset of base standards and protocols used to provide specific functions and services at layers 1 (physical) and 2 (data link) of the Open Systems Interconnection (OSI) Reference Model (ISO/IEC 7498). This seven-layered model describes the basic functions and services of communication protocols.

This standard specifically addresses the requirements for an NTCIP implementation based upon a mode of operation defined in the high-level data link control standard HDLC – ISO/IEC 3309 and a physical interface defined by the RS-232 interface standard. The specific clauses of the HDLC standard provide the definition of the layer 2 services and functions. The RS-232 interface (now referred to as EIA/TIA-232) standard provides the definition of the layer 1 services and functions. This subnetwork profile also provides the interface requirements between it and higher layer protocols (layers 3-7) or network profiles.

Who uses it?

This standard should be used by equipment manufacturers, systems integrators, and transportation agency personnel. Manufacturers and integrators should understand the specific implementation and operational requirements that it defines. Specification writers and acceptance testers can also find this standard useful, since it defines a profile implementation conformance specification (PICS). Manufacturers, integrators, and users can use this standard as:

The NTCIP family of standards is a joint project of the following standards development organizations:

American Association of State Highway and Transportation Officials (AASHTO)

Institute of Transportation Engineers (ITE)

National Electrical Manufacturers Association (NEMA)

(Contact information is shown at the end of this fact sheet)

To obtain a copy of this standard, please contact:

Global Engineering Documents

Web site: <http://global.ihs.com>

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- a. A checklist to reduce the risk of failure to conform to the standard through oversight;
- b. A detailed indication of the capabilities of the implementation;
- c. A basis for initially checking the possibility of inter-operating with another implementation; and
- d. The basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

How is it used?

At the data link layer in an NTCIP system, this standard uses a subset of the HDLC protocol to provide error detection, link activation and deactivation control, and notification services. It provides for connectionless delivery and is designed for operation in a primary-multiple secondary environment. At the physical layer, the EIA/TIA-232 interface serves as a direct connect method or acts as an external interface to other technologies. The direct interface is applicable where a single secondary device is relatively close to the primary management station. Alternatively, the EIA/TIA-232 interface can serve as the interface to external modems when dealing with multiple secondaries or long distances.

Scope

This standard is applicable to transportation-related devices that must operate in a primary/multiple secondary configurations where one primary controls the communications to many secondaries. As a subnetwork profile, it specifies a set and combination of standards and protocols applicable to the data link and physical layers of the OSI Reference Model. The primary purpose of this standard is to provide a simple data exchange tool that uses a connectionless delivery mechanism.

This subnetwork profile lists the requirements for an implementation using a mode of operation for the data link layer that is defined in the HDLC standard and using the physical, electrical, and mechanical specifications defined in the EIA/TIA-232 standard. In addition to the data link and physical layer protocols, it also defines the interface between the data link layer and the network layer.

Related documents

To accommodate the broad scope of this standardization effort, the NTCIP standard has been divided into numerous individual standards. A detailed list of related documents is available on the **NTCIP 9001 – NTCIP Guide** fact sheet. (The NTCIP Guide is also available on-line at www.ntcip.org).

EIA/TIA-232-E-1991 – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange

ISO/IEC 3309: 1993 – Information technology - Telecommunications and information exchange between systems, High-level data link control (HDLC) procedures - Frame structure.

ISO/IEC 4335: 1993 – Information technology - Telecommunications and information exchange between systems, High-level data link control (HDLC) procedures - Elements of procedures

ISO/IEC 7809: 1993 – Information technology - Telecommunications and information exchange between systems, High-level data link control (HDLC) procedures - Classes of procedures

RFC 1317 – Definitions of Managed Objects for RS-232-like Devices, B. Stewart

ISO/IEC 7498-1:1994 – Information technology - Open Systems Interconnection, Basic Reference Model: The Basic Model

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